

SEQUENCE LISTING

<110> Svendsen, Allan
 Beier, Lars
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 Jorgensen, Christel Thea

<120> CGTASE VARIANTS

<130> 10340-204-US

<150> DK PCT/DK2004/000468

<151> 2004-07-01

<150> DK PA 2003 00994

<151> 2003-07-01

<150> US 60/484,004

<151> 2003-07-01

<160> 20

<170> PatentIn version 3.5

<210> 1

<211> 713

<212> PRT

<213> Bacillus agaradherens

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 35 40 45

Asp Gly Ile Tyr Gln Ile Val Thr Asp Arg Phe Tyr Asp Gly Asp Glu
 50 55 60

Ser Asn Asn Pro Ser Gly Glu Leu Tyr Ser Glu Gly Cys Lys Asn Leu
 65 70 75 80

Arg Lys Tyr Cys Gly Gly Asp Trp Gln Gly Ile Ile Asp Lys Ile Asp
 85 90 95

Asp Gly Tyr Leu Thr Asn Met Gly Val Thr Ala Leu Trp Ile Ser Pro

100	105	110
Pro Val Glu Asn Ile Phe Glu Thr Ile Asp Asp Glu Ser Gly Thr Thr 115 120 125		
Ser Tyr His Gly Tyr Trp Ala Arg Asp Tyr Lys Lys Thr Asn Pro Phe 130 135 140		
Phe Gly Ser Thr Glu Asp Phe Glu Arg Leu Ile Glu Thr Ala His Ser 145 150 155 160		
His Asp Ile Lys Ile Val Ile Asp Leu Ala Pro Asn His Thr Ser Pro 165 170 175		
Ala Asp Phe Asp Asn Pro Asn Tyr Ala Glu Asn Gly Ile Leu Tyr Asp 180 185 190		
Asn Gly Asn Tyr Val Ser Ser Tyr Ser Asp Asn Ser Asp Leu Phe Leu 195 200 205		
Tyr Asn Gly Gly Thr Asp Phe Ser Thr Tyr Glu Asp Glu Ile Tyr Arg 210 215 220		
Asn Leu Phe Asp Leu Ala Ser Phe Asn His Ile Asn Ala Glu Leu Asn 225 230 235 240		
Asn Tyr Leu Glu Asp Ala Val Lys Lys Trp Leu Asp Leu Gly Ile Asp 245 250 255		
Gly Ile Arg Ile Asp Ala Val Ala His Met Pro Pro Gly Trp Gln Lys 260 265 270		
Ala Tyr Met Asp Thr Ile Tyr Asp His Arg Ala Val Phe Thr Phe Gly 275 280 285		
Glu Trp Phe Thr Gly Pro Tyr Gly Asn Glu Asp Tyr Thr Lys Phe Ala 290 295 300		
Asn Asn Ser Gly Met Ser Val Leu Asp Phe Arg Phe Ala Gln Thr Thr 305 310 315 320		
Arg Asn Val Ile Gly Asn Asn Asn Gly Thr Met Tyr Asp Ile Glu Lys 325 330 335		

Met Leu Thr Asp Thr Glu Asn Asp Tyr Asp Arg Pro Gln Asp Gln Val
340 345 350

Thr Phe Leu Asp Asn His Asp Met Ser Arg Phe Thr Asn Asp Gly Glu
355 360 365

Ser Thr Arg Thr Thr Asp Ile Gly Leu Ala Leu Met Leu Thr Ser Arg
370 375 380

Gly Val Pro Thr Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Glu Gly Asp
385 390 395 400

Gly Asp Pro Gly Ser Arg Gly Met Met Glu Ser Phe Gly Glu Asn Thr
405 410 415

Asp Ala Tyr Lys Leu Ile Gln Lys Leu Ala Pro Leu Arg Lys Ser Asn
420 425 430

Pro Ala Tyr Gly Tyr Gly Thr Thr Lys Glu Arg Trp Ile Asn Asp Asp
435 440 445

Val Ile Ile Tyr Glu Arg Asn Phe Gly Asp Asn Tyr Ala Leu Ile Ala
450 455 460

Ile Asn Arg Asn Leu Asn Thr Ser Tyr Asn Ile Gln Gly Leu Gln Thr
465 470 475 480

Glu Met Pro Ser Asn Ser Tyr Asp Asp Val Leu Asp Gly Leu Leu Asp
485 490 495

Gly Gln Ser Ile Val Val Asp Asn Asn Gly Glu Val Asn Glu Phe Gln
500 505 510

Met Ser Pro Gly Glu Val Gly Val Trp Glu Phe Glu Ala Thr Asn Val
515 520 525

Asp Lys Pro Ser Ile Gly Gln Val Gly Pro Ile Ile Gly Glu Ala Gly
530 535 540

Arg Thr Val Thr Ile Ser Gly Glu Gly Phe Gly Ser Ser Pro Gly Thr
545 550 555 560

Val Gln Phe Gly Ser Thr Ser Ala Glu Ile Val Ser Trp Asn Asp Thr
565 570 575

Val Ile Ile Ile Thr Val Pro Asn Asn Glu Ala Gly Tyr His Asp Ile
580 585 590

Thr Val Val Thr Glu Asp Glu Gln Val Ser Asn Ala Tyr Glu Phe Glu
595 600 605

Val Leu Thr Ala Asp Gln Val Thr Val Arg Phe Ile Ile Asp Asn Ala
610 615 620

Glu Thr Lys Met Gly Glu Asn Ile Phe Leu Val Gly Asn Val His Glu
625 630 635 640

Leu Gly Asn Trp Asp Pro Glu Gln Ser Val Gly Arg Phe Phe Asn Gln
645 650 655

Val Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Asn Val Pro Ala
660 665 670

Asn Thr Asp Leu Glu Phe Lys Phe Ile Lys Ile Asp Gln Asp Asn Asn
675 680 685

Val Thr Trp Gln Ser Gly Ala Asn His Thr Tyr Ser Ser Pro Glu Ser
690 695 700

Gly Thr Gly Ile Ile Arg Val Asp Trp
705 710

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<213> Bacillus agaradherens

<400> 2

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35	40	45
Asp Val Ile Tyr Gln Ile Val Thr Asp Arg Phe Tyr Asp Gly Asp Glu		
50	55	60
Ser Asn Asn Pro Ser Gly Glu Leu Tyr Ser Glu Asp Cys Lys Asn Leu		
65	70	75
Arg Lys Tyr Cys Gly Gly Asp Trp Gln Gly Ile Ile Asp Lys Ile Asp		
85	90	95
Asp Gly Tyr Leu Thr Asn Met Gly Val Thr Ala Leu Trp Ile Ser Pro		
100	105	110
Pro Val Glu Asn Ile Phe Glu Thr Ile Asp Asp Glu Phe Gly Thr Thr		
115	120	125
Ser Tyr His Gly Tyr Trp Ala Arg Asp Tyr Lys Lys Thr Asn Pro Phe		
130	135	140
Phe Gly Ser Thr Glu Asp Phe Glu Arg Leu Ile Glu Thr Ala His Ser		
145	150	155
His Asp Ile Lys Ile Val Ile Asp Leu Ala Pro Asn His Thr Ser Pro		
165	170	175
Ala Asp Phe Asp Asn Pro Asp Tyr Ala Glu Asn Gly Val Leu Tyr Asp		
180	185	190
Asp Gly Asn Tyr Leu Gly Ser Tyr Ser Asp Asp Ser Asp Leu Phe Leu		
195	200	205
Tyr Asn Gly Gly Thr Asp Phe Ser Asn Tyr Glu Asp Glu Ile Tyr Arg		
210	215	220
Asn Leu Phe Asp Leu Ala Ser Phe Asn His Ile Asn Ser Glu Leu Asn		
225	230	235
Asn Tyr Leu Glu Asp Ala Val Lys Lys Trp Leu Asp Leu Gly Ile Asp		
245	250	255
Gly Ile Arg Ile Asp Ala Val Ala His Met Pro Pro Gly Trp Lys Lys		
260	265	270

Ala Tyr Met Asp Thr Ile Tyr Asp His Arg Ala Val Phe Thr Phe Gly
275 280 285

Glu Trp Phe Thr Gly Pro Ser Gly Asn Glu Asp Tyr Thr Lys Phe Ala
290 295 300

Asn Asn Ser Gly Met Ser Val Leu Asp Phe Arg Phe Ala Gln Thr Thr
305 310 315 320

Arg Asn Val Ile Gly Asn Asn Asn Gly Thr Met Tyr Asp Ile Glu Lys
325 330 335

Met Leu Thr Asp Thr Glu Asn Asp Tyr Asp Arg Pro Gln Asp Gln Val
340 345 350

Thr Phe Leu Asp Asn His Asp Met Ser Arg Phe Thr Asn Gly Gly Glu
355 360 365

Ser Thr Arg Thr Thr Asp Ile Gly Leu Ala Leu Met Leu Thr Ser Arg
370 375 380

Gly Val Pro Thr Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Lys Gly Asp
385 390 395 400

Gly Asp Pro Gly Ser Arg Gly Met Met Ala Ser Phe Asp Glu Asn Thr
405 410 415

Asp Ala Tyr Lys Leu Ile Gln Lys Leu Ala Pro Leu Arg Lys Ser Asn
420 425 430

Pro Ala Tyr Gly Tyr Gly Thr Thr Thr Glu Arg Trp Ile Asn Asp Asp
435 440 445

Val Leu Ile Tyr Glu Arg His Phe Gly Glu Asn Tyr Ala Leu Ile Ala
450 455 460

Ile Asn Arg Ser Leu Asn Thr Ser Tyr Asn Ile Gln Gly Leu Gln Thr
465 470 475 480

Glu Met Pro Ser Asn Ser Tyr Asp Asp Val Leu Asp Gly Leu Leu Asp
485 490 495

Gly Gln Ser Ile Val Val Asp Asn Lys Gly Gly Val Asn Glu Phe Gln
500 505 510

Met Ser Pro Gly Glu Val Ser Val Trp Glu Phe Glu Ala Glu Asn Val
515 520 525

Asp Lys Pro Ser Ile Gly Gln Val Gly Pro Ile Ile Gly Glu Ala Gly
530 535 540

Arg Thr Val Thr Ile Ser Gly Glu Gly Phe Gly Ser Ser Gln Gly Thr
545 550 555 560

Val His Phe Gly Ser Thr Ser Ala Glu Ile Leu Ser Trp Asn Asp Thr
565 570 575

Ile Ile Thr Leu Thr Val Pro Asn Asn Glu Ala Gly Tyr His Asp Ile
580 585 590

Thr Val Val Thr Glu Asp Glu Gln Val Ser Asn Ala Tyr Glu Phe Glu
595 600 605

Val Leu Thr Ala Asp Gln Val Thr Val Arg Phe Ile Ile Asp Asn Ala
610 615 620

Glu Thr Lys Leu Gly Glu Asn Val Phe Leu Val Gly Asn Val His Glu
625 630 635 640

Leu Gly Asn Trp Asp Pro Glu Gln Ser Val Gly Arg Phe Phe Asn Gln
645 650 655

Ile Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Asn Val Pro Ala
660 665 670

Asn Thr Asp Leu Glu Phe Lys Phe Ile Lys Ile Asp Gln Asp Asn Asn
675 680 685

Val Ile Trp Gln Ser Gly Ala Asn Gln Thr Tyr Ser Ser Pro Glu Ser
690 695 700

Gly Thr Gly Ile Ile Arg Val Asp Trp
705 710

<210> 3
<211> 714
<212> PRT
<213> Panibacillus macerans

<400> 3

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35 40 45

Thr Asp Arg Phe Ala Asp Gly Asp Arg Thr Asn Asn Pro Ala Gly Asp
50 55 60

Ala Phe Ser Gly Asp Arg Ser Asn Leu Lys Leu Tyr Phe Gly Gly Asp
65 70 75 80

Trp Gln Gly Ile Ile Asp Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met
85 90 95

Gly Val Thr Ala Leu Trp Ile Ser Gln Pro Val Glu Asn Ile Thr Ser
100 105 110

Val Ile Lys Tyr Ser Gly Val Asn Asn Thr Ser Tyr His Gly Tyr Trp
115 120 125

Ala Arg Asp Phe Lys Gln Thr Asn Asp Ala Phe Gly Asp Phe Ala Asp
130 135 140

Phe Gln Asn Leu Ile Asp Thr Ala His Ala His Asn Ile Lys Val Val
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Asp Arg Asp Asn Pro
165 170 175

Gly Phe Ala Glu Asn Gly Gly Met Tyr Asp Asn Gly Ser Leu Leu Gly
180 185 190

Ala Tyr Ser Asn Asp Thr Ala Gly Leu Phe His His Asn Gly Gly Thr
195 200 205

Asp Phe Ser Thr Ile Glu Asp Gly Ile Tyr Lys Asn Leu Tyr Asp Leu
210 215 220

Ala Asp Ile Asn His Asn Asn Asn Ala Met Asp Ala Tyr Phe Lys Ser
225 230 235 240

Ala Ile Asp Leu Trp Leu Gly Met Gly Val Asp Gly Ile Arg Phe Asp
245 250 255

Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Val Ser Ser
260 265 270

Ile Tyr Gly Gly Asp His Pro Val Phe Thr Phe Gly Glu Trp Tyr Leu
275 280 285

Gly Ala Asp Gln Thr Asp Gly Asp Asn Ile Lys Phe Ala Asn Glu Ser
290 295 300

Gly Met Asn Leu Leu Asp Phe Glu Tyr Ala Gln Glu Val Arg Glu Val
305 310 315 320

Phe Arg Asp Lys Thr Glu Thr Met Lys Asp Leu Tyr Glu Val Leu Ala
325 330 335

Ser Thr Glu Ser Gln Tyr Asp Tyr Ile Asn Asn Met Val Thr Phe Ile
340 345 350

Asp Asn His Asp Met Asp Arg Phe Gln Val Ala Gly Ser Gly Thr Arg
355 360 365

Ala Thr Glu Gln Ala Leu Ala Leu Thr Leu Thr Ser Arg Gly Val Pro
370 375 380

Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly Asp Gly Asp Pro
385 390 395 400

Asn Asn Arg Ala Met Met Thr Ser Phe Asn Thr Gly Thr Thr Ala Tyr
405 410 415

Lys Val Ile Gln Ala Leu Ala Pro Leu Arg Lys Ser Asn Pro Ala Ile
420 425 430

Ala Tyr Gly Thr Thr Thr Glu Arg Trp Val Asn Asn Asp Val Leu Ile
435 440 445

Ile Glu Arg Lys Phe Gly Ser Ser Ala Ala Leu Val Ala Ile Asn Arg
450 455 460

Asn Ser Ser Ala Ala Tyr Pro Ile Ser Gly Leu Leu Ser Ser Leu Pro
465 470 475 480

Ala Gly Thr Tyr Ser Asp Val Leu Asn Gly Leu Leu Asn Gly Asn Ser
485 490 495

Ile Thr Val Gly Ser Gly Gly Ala Val Thr Asn Phe Thr Leu Ala Ala
500 505 510

Gly Gly Thr Ala Val Trp Gln Tyr Thr Ala Pro Glu Thr Ser Pro Ala
515 520 525

Ile Gly Asn Val Gly Pro Thr Met Gly Gln Pro Gly Asn Ile Val Thr
530 535 540

Ile Asp Gly Arg Gly Phe Gly Gly Thr Ala Gly Thr Val Tyr Phe Gly
545 550 555 560

Thr Thr Ala Val Thr Gly Ser Gly Ile Val Ser Trp Glu Asp Thr Gln
565 570 575

Ile Lys Ala Val Ile Pro Lys Val Ala Ala Gly Lys Thr Gly Val Ser
580 585 590

Val Lys Thr Ser Ser Gly Thr Ala Ser Asn Thr Phe Lys Ser Phe Asn
595 600 605

Val Leu Thr Gly Asp Gln Val Thr Val Arg Phe Leu Val Asn Gln Ala
610 615 620

Asn Thr Asn Tyr Gly Thr Asn Val Tyr Leu Val Gly Asn Ala Ala Glu
625 630 635 640

Leu Gly Ser Trp Asp Pro Asn Lys Ala Ile Gly Pro Met Tyr Asn Gln
645 650 655

Val Ile Ala Lys Tyr Pro Ser Trp Tyr Tyr Asp Val Ser Val Pro Ala
660 665 670

Gly Thr Lys Leu Asp Phe Lys Phe Ile Lys Lys Gly Gly Gly Thr Val
675 680 685

Thr Trp Glu Gly Gly Gly Asn His Thr Tyr Thr Thr Pro Ala Ser Gly
690 695 700

Val Gly Thr Val Thr Val Asp Trp Gln Asn
705 710

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<211> 713
<212> PRT
<213> Panibacillus macerans

<400> 4

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35 40 45

Thr Asp Arg Phe Val Asp Gly Asn Ser Ala Asn Asn Pro Thr Gly Ala
50 55 60

Ala Phe Ser Ser Asp His Ser Asn Leu Lys Leu Tyr Phe Gly Gly Asp
65 70 75 80

Trp Gln Gly Ile Thr Asn Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met
85 90 95

Gly Ile Thr Ala Leu Trp Ile Ser Gln Pro Val Glu Asn Ile Thr Ala
100 105 110

Val Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala Tyr His Gly Tyr Trp
115 120 125

Pro Arg Asp Phe Lys Lys Thr Asn Ala Ala Phe Gly Ser Phe Thr Asp
130 135 140

Phe Ser Asn Leu Ile Ala Ala Ala His Ser His Asn Ile Lys Val Val
145 150 155 160

Met Asp Phe Ala Pro Asn His Thr Asn Pro Ala Ser Ser Thr Asp Pro
165 170 175

Ser Phe Ala Glu Asn Gly Ala Leu Tyr Asn Asn Gly Thr Leu Leu Gly
180 185 190

Lys Tyr Ser Asn Asp Thr Ala Gly Leu Phe His His Asn Gly Gly Thr
195 200 205

Asp Phe Ser Thr Thr Glu Ser Gly Ile Tyr Lys Asn Leu Tyr Asp Leu
210 215 220

Ala Asp Ile Asn Gln Asn Asn Asn Thr Ile Asp Ser Tyr Leu Lys Glu
225 230 235 240

Ser Ile Gln Leu Trp Leu Asn Leu Gly Val Asp Gly Ile Arg Phe Asp
245 250 255

Ala Val Lys His Met Pro Gln Gly Trp Gln Lys Ser Tyr Val Ser Ser
260 265 270

Ile Tyr Ser Ser Ala Asn Pro Val Phe Thr Phe Gly Glu Trp Phe Leu
275 280 285

Gly Pro Asp Glu Met Thr Gln Asp Asn Ile Asn Phe Ala Asn Gln Ser
290 295 300

Gly Met His Leu Leu Asp Phe Ala Phe Ala Gln Glu Ile Arg Glu Val
305 310 315 320

Phe Arg Asp Lys Ser Glu Thr Met Thr Asp Leu Asn Ser Val Ile Ser
325 330 335

Ser Thr Gly Ser Ser Tyr Asn Tyr Ile Asn Asn Met Val Thr Phe Ile
340 345 350

Asp Asn His Asp Met Asp Arg Phe Gln Gln Ala Gly Ala Ser Thr Arg
355 360 365

Pro Thr Glu Gln Ala Leu Ala Val Thr Leu Thr Ser Arg Gly Val Pro
370 375 380

Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly Asn Gly Asp Pro
385 390 395 400

Asn Asn Arg Gly Met Met Thr Gly Phe Asp Thr Asn Lys Thr Ala Tyr
405 410 415

Lys Val Ile Lys Ala Leu Ala Pro Leu Arg Lys Ser Asn Pro Ala Leu
420 425 430

Ala Tyr Gly Ser Thr Thr Gln Arg Trp Val Asn Ser Asp Val Tyr Val
435 440 445

Tyr Glu Arg Lys Phe Gly Ser Asn Val Ala Leu Val Ala Val Asn Arg
450 455 460

Ser Ser Thr Thr Ala Tyr Pro Ile Ser Gly Ala Leu Thr Ala Leu Pro
465 470 475 480

Asn Gly Thr Tyr Thr Asp Val Leu Gly Gly Leu Leu Asn Gly Asn Ser
485 490 495

Ile Thr Val Asn Gly Gly Thr Val Ser Asn Phe Thr Leu Ala Ala Gly
500 505 510

Gly Thr Ala Val Trp Gln Tyr Thr Thr Thr Glu Ser Ser Pro Ile Ile
515 520 525

Gly Asn Val Gly Pro Thr Met Gly Lys Pro Gly Asn Thr Ile Thr Ile
530 535 540

Asp Gly Arg Gly Phe Gly Thr Thr Lys Asn Lys Val Thr Phe Gly Thr
545 550 555 560

Thr Ala Val Thr Gly Ala Asn Ile Val Ser Trp Glu Asp Thr Glu Ile
565 570 575

Lys Val Lys Val Pro Asn Val Ala Ala Gly Asn Thr Ala Val Thr Val
580 585 590

Thr Asn Ala Ala Gly Thr Thr Ser Ala Ala Phe Asn Asn Phe Asn Val
595 600 605

Leu Thr Ala Asp Gln Val Thr Val Arg Phe Lys Val Asn Asn Ala Thr
610 615 620

Thr Ala Leu Gly Gln Asn Val Tyr Leu Thr Gly Asn Val Ala Glu Leu
625 630 635 640

Gly Asn Trp Thr Ala Ala Asn Ala Ile Gly Pro Met Tyr Asn Gln Val
645 650 655

Glu Ala Ser Tyr Pro Thr Trp Tyr Phe Asp Val Ser Val Pro Ala Asn
660 665 670

Thr Ala Leu Gln Phe Lys Phe Ile Lys Val Asn Gly Ser Thr Val Thr
675 680 685

Trp Glu Gly Gly Asn Asn His Thr Phe Thr Ser Pro Ser Ser Gly Val
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Ala Thr Val Thr Val Asp Trp Gln Asn
705 710

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<213> Thermoanaerobacterium thermosulfurigenes

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35 40 45

Tyr Phe Gly Gly Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly
50 55 60

Tyr Leu Thr Gly Met Gly Val Thr Ala Ile Trp Ile Ser Gln Pro Val
65 70 75 80

Glu Asn Ile Tyr Ala Val Leu Pro Asp Ser Thr Phe Gly Gly Ser Thr
85 90 95

Ser Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Arg Thr Asn Pro Tyr
100 105 110

Phe Gly Ser Phe Thr Asp Phe Gln Asn Leu Ile Asn Thr Ala His Ala
115 120 125

His Asn Ile Lys Val Ile Ile Asp Phe Ala Pro Asn His Thr Ser Pro
130 135 140

Ala Ser Glu Thr Asp Pro Thr Tyr Ala Glu Asn Gly Arg Leu Tyr Asp
145 150 155 160

Asn Gly Thr Leu Leu Gly Gly Tyr Thr Asn Asp Thr Asn Gly Tyr Phe
165 170 175

His His Tyr Gly Gly Thr Asp Phe Ser Ser Tyr Glu Asp Gly Ile Tyr
180 185 190

Arg Asn Leu Phe Asp Leu Ala Asp Leu Asn Gln Gln Asn Ser Thr Ile
195 200 205

Asp Ser Tyr Leu Lys Ser Ala Ile Lys Val Trp Leu Asp Met Gly Ile
210 215 220

Asp Gly Ile Arg Leu Asp Ala Val Lys His Met Pro Phe Gly Trp Gln
225 230 235 240

Lys Asn Phe Met Asp Ser Ile Leu Ser Tyr Arg Pro Val Phe Thr Phe
245 250 255

Gly Glu Trp Phe Leu Gly Thr Asn Glu Ile Asp Val Asn Asn Thr Tyr
260 265 270

Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Ser Gln
275 280 285

Lys Val Arg Gln Val Phe Arg Asp Asn Thr Asp Thr Met Tyr Gly Leu
290 295 300

Asp Ser Met Ile Gln Ser Thr Ala Ser Asp Tyr Asn Phe Ile Asn Asp
305 310 315 320

Met Val Thr Phe Ile Asp Asn His Asp Met Asp Arg Phe Tyr Asn Gly
325 330 335

Gly Ser Thr Arg Pro Val Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser
340 345 350

Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly
355 360 365

Asn Gly Asp Pro Tyr Asn Arg Ala Met Met Thr Ser Phe Asn Thr Ser
370 375 380

Thr Thr Ala Tyr Asn Val Ile Lys Lys Leu Ala Pro Leu Arg Lys Ser
385 390 395 400

Asn Pro Ala Ile Ala Tyr Gly Thr Thr Gln Gln Arg Trp Ile Asn Asn
405 410 415

Asp Val Tyr Ile Tyr Glu Arg Lys Phe Gly Asn Asn Val Ala Leu Val
420 425 430

Ala Ile Asn Arg Asn Leu Ser Thr Ser Tyr Asn Ile Thr Gly Leu Tyr
435 440 445

Thr Ala Leu Pro Ala Gly Thr Tyr Thr Asp Val Leu Gly Gly Leu Leu
450 455 460

Asn Gly Asn Ser Ile Ser Val Ala Ser Asp Gly Ser Val Thr Pro Phe
465 470 475 480

Thr Leu Ser Ala Gly Glu Val Ala Val Trp Gln Tyr Val Ser Ser Ser
485 490 495

Asn Ser Pro Leu Ile Gly His Val Gly Pro Thr Met Thr Lys Ala Gly
500 505 510

Gln Thr Ile Thr Ile Asp Gly Arg Gly Phe Gly Thr Thr Ser Gly Gln
515 520 525

Val Leu Phe Gly Ser Thr Ala Gly Thr Ile Val Ser Trp Asp Asp Thr
530 535 540

Glu Val Lys Val Lys Val Pro Ser Val Thr Pro Gly Lys Tyr Asn Ile
545 550 555 560

Ser Leu Lys Thr Ser Ser Gly Ala Thr Ser Asn Thr Tyr Asn Asn Ile
565 570 575

Asn Ile Leu Thr Gly Asn Gln Ile Cys Val Arg Phe Val Val Asn Asn
580 585 590

Ala Ser Thr Val Tyr Gly Glu Asn Val Tyr Leu Thr Gly Asn Val Ala
595 600 605

Glu Leu Gly Asn Trp Asp Thr Ser Lys Ala Ile Gly Pro Met Phe Asn
610 615 620

Gln Val Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Ser Val Pro
625 630 635 640

Ala Gly Thr Thr Ile Gln Phe Lys Phe Ile Lys Lys Asn Gly Asn Thr
645 650 655

Ile Thr Trp Glu Gly Gly Ser Asn His Thr Tyr Thr Val Pro Ser Ser
660 665 670

Ser Thr Gly Thr Val Ile Val Asn Trp Gln Gln
675 680

<210> 6

<211> 683

<212> PRT

<213> Thermoanaerobacter sp.

<400> 6

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Asn Pro Thr Gly Asp Leu Tyr Asp Pro Thr His Thr Ser Leu Lys Lys
35 40 45

Tyr Phe Gly Gly Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly
50 55 60

Tyr Leu Thr Gly Met Gly Ile Thr Ala Ile Trp Ile Ser Gln Pro Val
65 70 75 80

Glu Asn Ile Tyr Ala Val Leu Pro Asp Ser Thr Phe Gly Gly Ser Thr
85 90 95

Ser Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro Phe
100 105 110

Phe Gly Ser Phe Thr Asp Phe Gln Asn Leu Ile Ala Thr Ala His Ala
115 120 125

His Asn Ile Lys Val Ile Ile Asp Phe Ala Pro Asn His Thr Ser Pro
130 135 140

Ala Ser Glu Thr Asp Pro Thr Tyr Gly Glu Asn Gly Arg Leu Tyr Asp
145 150 155 160

Asn Gly Val Leu Leu Gly Gly Tyr Thr Asn Asp Thr Asn Gly Tyr Phe
165 170 175

His His Tyr Gly Gly Thr Asn Phe Ser Ser Tyr Glu Asp Gly Ile Tyr
180 185 190

Arg Asn Leu Phe Asp Leu Ala Asp Leu Asp Gln Gln Asn Ser Thr Ile
195 200 205

Asp Ser Tyr Leu Lys Ala Ala Ile Lys Leu Trp Leu Asp Met Gly Ile
210 215 220

Asp Gly Ile Arg Met Asp Ala Val Lys His Met Ala Phe Gly Trp Gln
225 230 235 240

Lys Asn Phe Met Asp Ser Ile Leu Ser Tyr Arg Pro Val Phe Thr Phe
245 250 255

Gly Glu Trp Tyr Leu Gly Thr Asn Glu Val Asp Pro Asn Asn Thr Tyr
260 265 270

Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Ala Gln
275 280 285

Lys Val Arg Gln Val Phe Arg Asp Asn Thr Asp Thr Met Tyr Gly Leu
290 295 300

Asp Ser Met Ile Gln Ser Thr Ala Ala Asp Tyr Asn Phe Ile Asn Asp
305 310 315 320

Met Val Thr Phe Ile Asp Asn His Asp Met Asp Arg Phe Tyr Thr Gly
325 330 335

Gly Ser Thr Arg Pro Val Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser
340 345 350

Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly
355 360 365

Asn Gly Asp Pro Tyr Asn Arg Ala Met Met Thr Ser Phe Asp Thr Thr
370 375 380

Thr Thr Ala Tyr Asn Val Ile Lys Lys Leu Ala Pro Leu Arg Lys Ser
385 390 395 400

Asn Pro Ala Ile Ala Tyr Gly Thr Gln Lys Gln Arg Trp Ile Asn Asn
405 410 415

Asp Val Tyr Ile Tyr Glu Arg Gln Phe Gly Asn Asn Val Ala Leu Val
420 425 430

Ala Ile Asn Arg Asn Leu Ser Thr Ser Tyr Tyr Ile Thr Gly Leu Tyr
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Thr Ala Leu Pro Ala Gly Thr Tyr Ser Asp Met Leu Gly Gly Leu Leu
450 455 460

Asn Gly Ser Ser Ile Thr Val Ser Ser Asn Gly Ser Val Thr Pro Phe
465 470 475 480

Thr Leu Ala Pro Gly Glu Val Ala Val Trp Gln Tyr Val Ser Thr Thr
485 490 495

Asn Pro Pro Leu Ile Gly His Val Gly Pro Thr Met Thr Lys Ala Gly
500 505 510

Gln Thr Ile Thr Ile Asp Gly Arg Gly Phe Gly Thr Thr Ala Gly Gln
515 520 525

Val Leu Phe Gly Thr Thr Pro Ala Thr Ile Val Ser Trp Glu Asp Thr
530 535 540

Glu Val Lys Val Lys Val Pro Ala Leu Thr Pro Gly Lys Tyr Asn Ile
545 550 555 560

Thr Leu Lys Thr Ala Ser Gly Val Thr Ser Asn Ser Tyr Asn Asn Ile
565 570 575

Asn Val Leu Thr Gly Asn Gln Val Cys Val Arg Phe Val Val Asn Asn
580 585 590

Ala Thr Thr Val Trp Gly Glu Asn Val Tyr Leu Thr Gly Asn Val Ala
595 600 605

Glu Leu Gly Asn Trp Asp Thr Ser Lys Ala Ile Gly Pro Met Phe Asn
610 615 620

Gln Val Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Ser Val Pro
625 630 635 640

Ala Gly Thr Thr Ile Glu Phe Lys Phe Ile Lys Lys Asn Gly Ser Thr
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Val Thr Trp Glu Gly Gly Tyr Asn His Val Tyr Thr Thr Pro Thr Ser
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Gly Thr Ala Thr Val Ile Val Asp Trp Gln Pro
675 680

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<213> Bacillus circulans

<400> 7

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Tyr Ala Asp Pro Asp Thr Ala Val Thr Asn Lys Gln Ser Phe Ser Thr
35 40 45

Asp Val Ile Tyr Gln Val Phe Thr Asp Arg Phe Leu Asp Gly Asn Pro
50 55 60

Ser Asn Asn Pro Thr Gly Ala Ala Tyr Asp Ala Thr Cys Ser Asn Leu
65 70 75 80

Lys Leu Tyr Cys Gly Gly Asp Trp Gln Gly Leu Ile Asn Lys Ile Asn
85 90 95

Asp Asn Tyr Phe Ser Asp Leu Gly Val Thr Ala Leu Trp Ile Ser Gln
100 105 110

Pro Val Glu Asn Ile Phe Ala Thr Ile Asn Tyr Ser Gly Val Thr Asn
115 120 125

Thr Ala Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro
130 135 140

Tyr Phe Gly Thr Met Ala Asp Phe Gln Asn Leu Ile Thr Thr Ala His
145 150 155 160

Ala Lys Gly Ile Lys Ile Val Ile Asp Phe Ala Pro Asn His Thr Ser
165 170 175

Pro Ala Met Glu Thr Asp Thr Ser Phe Ala Glu Asn Gly Arg Leu Tyr
180 185 190

Asp Asn Gly Thr Leu Val Gly Gly Tyr Thr Asn Asp Thr Asn Gly Tyr
195 200 205

Phe His His Asn Gly Gly Ser Asp Phe Ser Ser Leu Glu Asn Gly Ile
210 215 220

Tyr Lys Asn Leu Tyr Asp Leu Ala Asp Phe Asn His Asn Asn Ala Thr
225 230 235 240

Ile Asp Lys Tyr Phe Lys Asp Ala Ile Lys Leu Trp Leu Asp Met Gly
245 250 255

Val Asp Gly Ile Arg Val Asp Ala Val Lys His Met Pro Leu Gly Trp
260 265 270

Gln Lys Ser Trp Met Ser Ser Ile Tyr Ala His Lys Pro Val Phe Thr
275 280 285

Phe Gly Glu Trp Phe Leu Gly Ser Ala Ala Ser Asp Ala Asp Asn Thr
290 295 300

Asp Phe Ala Asn Lys Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Asn
305 310 315 320

Ser Ala Val Arg Asn Val Phe Arg Asp Asn Thr Ser Asn Met Tyr Ala
325 330 335

Leu Asp Ser Met Ile Asn Ser Thr Ala Thr Asp Tyr Asn Gln Val Asn
340 345 350

Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Asp Arg Phe Lys Thr
355 360 365

Ser Ala Val Asn Asn Arg Arg Leu Glu Gln Ala Leu Ala Phe Thr Leu
370 375 380

Thr Ser Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Leu
385 390 395 400

Thr Gly Asn Gly Asp Pro Asp Asn Arg Ala Lys Met Pro Ser Phe Ser
405 410 415

Lys Ser Thr Thr Ala Phe Asn Val Ile Ser Lys Leu Ala Pro Leu Arg
420 425 430

Lys Ser Asn Pro Ala Ile Ala Tyr Gly Ser Thr Gln Gln Arg Trp Ile
435 440 445

Asn Asn Asp Val Tyr Val Tyr Glu Arg Lys Phe Gly Lys Ser Val Ala
450 455 460

Val Val Ala Val Asn Arg Asn Leu Ser Thr Ser Ala Ser Ile Thr Gly
465 470 475 480

Leu Ser Thr Ser Leu Pro Thr Gly Ser Tyr Thr Asp Val Leu Gly Gly
485 490 495

Val Leu Asn Gly Asn Asn Ile Thr Ser Thr Asn Gly Ser Ile Asn Asn
500 505 510

Phe Thr Leu Ala Ala Gly Ala Thr Ala Val Trp Gln Tyr Thr Thr Ala
515 520 525

Glu Thr Thr Pro Thr Ile Gly His Val Gly Pro Val Met Gly Lys Pro
530 535 540

Gly Asn Val Val Thr Ile Asp Gly Arg Gly Phe Gly Ser Thr Lys Gly
545 550 555 560

Thr Val Tyr Phe Gly Thr Thr Ala Val Thr Gly Ala Ala Ile Thr Ser
565 570 575

Trp Glu Asp Thr Gln Ile Lys Val Thr Ile Pro Ser Val Ala Ala Gly
580 585 590

Asn Tyr Ala Val Lys Val Ala Ala Ser Gly Val Asn Ser Asn Ala Tyr
595 600 605

Asn Asn Phe Thr Ile Leu Thr Gly Asp Gln Val Thr Val Arg Phe Val
610 615 620

Val Asn Asn Ala Ser Thr Thr Leu Gly Gln Asn Leu Tyr Leu Thr Gly
625 630 635 640

Asn Val Ala Glu Leu Gly Asn Trp Ser Thr Gly Ser Thr Ala Ile Gly
645 650 655

Pro Ala Phe Asn Gln Val Ile His Gln Tyr Pro Thr Trp Tyr Tyr Asp
660 665 670

Val Ser Val Pro Ala Gly Lys Gln Leu Glu Phe Lys Phe Phe Lys Lys
675 680 685

Asn Gly Ser Thr Ile Thr Trp Glu Ser Gly Ser Asn His Thr Phe Thr

690

695

700

Thr Pro Ala Ser Gly Thr Ala Thr Val Thr Val Asn Trp Gln
 705 710 715

<210> 8

<211> 718

<212> PRT

<213> Bacillus sp. 38-2

<400> 8

Met Phe Gln Met Ala Lys Arg Val Leu Leu Ser Thr Thr Leu Thr Phe
 1 5 10 15

Ser Leu Leu Ala Gly Ser Ala Leu Pro Phe Leu Pro Ala Ser Ala Ile
 20 25 30

Tyr Ala Asp Ala Asp Thr Ala Val Thr Asn Lys Gln Asn Phe Ser Thr
 35 40 45

Asp Val Ile Tyr Gln Val Phe Thr Asp Arg Phe Leu Asp Gly Asn Pro
 50 55 60

Ser Asn Asn Pro Thr Gly Ala Ala Phe Asp Gly Thr Cys Ser Asn Leu
 65 70 75 80

Lys Leu Tyr Cys Gly Gly Asp Trp Gln Gly Leu Val Asn Lys Ile Asn
 85 90 95

Asp Asn Tyr Phe Ser Asp Leu Gly Val Thr Ala Leu Trp Ile Ser Gln
 100 105 110

Pro Val Glu Asn Ile Phe Ala Thr Ile Asn Tyr Ser Gly Val Thr Asn
 115 120 125

Thr Ala Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro
 130 135 140

Tyr Phe Gly Thr Met Thr Asp Phe Gln Asn Leu Val Thr Thr Ala His
 145 150 155 160

Ala Lys Gly Ile Lys Ile Ile Ile Asp Phe Ala Pro Asn His Thr Ser
 165 170 175

Pro Ala Met Glu Thr Asp Thr Ser Phe Ala Glu Asn Gly Lys Leu Tyr
180 185 190

Asp Asn Gly Asn Leu Val Gly Gly Tyr Thr Asn Asp Thr Asn Gly Tyr
195 200 205

Phe His His Asn Gly Gly Ser Asp Phe Ser Thr Leu Glu Asn Gly Ile
210 215 220

Tyr Lys Asn Leu Tyr Asp Leu Ala Asp Leu Asn His Asn Asn Ser Thr
225 230 235 240

Ile Asp Thr Tyr Phe Lys Asp Ala Ile Lys Leu Trp Leu Asp Met Gly
245 250 255

Val Asp Gly Ile Arg Val Asp Ala Val Lys His Met Pro Gln Gly Trp
260 265 270

Gln Lys Asn Trp Met Ser Ser Ile Tyr Ala His Lys Pro Val Phe Thr
275 280 285

Phe Gly Glu Trp Phe Leu Gly Ser Ala Ala Pro Asp Ala Asp Asn Thr
290 295 300

Asp Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Asn
305 310 315 320

Ser Ala Val Arg Asn Val Phe Arg Asp Asn Thr Ser Asn Met Tyr Ala
325 330 335

Leu Asp Ser Met Leu Thr Ala Thr Ala Ala Asp Tyr Asn Gln Val Asn
340 345 350

Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Asp Arg Phe Lys Thr
355 360 365

Ser Ala Val Asn Asn Arg Arg Leu Glu Gln Ala Leu Ala Phe Thr Leu
370 375 380

Thr Ser Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Leu
385 390 395 400

Thr Gly Asn Gly Asp Pro Asp Asn Arg Gly Lys Met Pro Ser Phe Ser
405 410 415

Lys Ser Thr Thr Ala Phe Asn Val Ile Ser Lys Leu Ala Pro Leu Arg
420 425 430

Lys Ser Asn Pro Ala Ile Ala Tyr Gly Ser Thr Gln Gln Arg Trp Ile
435 440 445

Asn Asn Asp Val Tyr Ile Tyr Glu Arg Lys Phe Gly Lys Ser Val Ala
450 455 460

Val Val Ala Val Asn Arg Asn Leu Thr Thr Pro Thr Ser Ile Thr Asn
465 470 475 480

Leu Asn Thr Ser Leu Pro Ser Gly Thr Tyr Thr Asp Val Leu Gly Gly
485 490 495

Val Leu Asn Gly Asn Asn Ile Thr Ser Ser Gly Gly Asn Ile Ser Ser
500 505 510

Phe Thr Leu Ala Ala Gly Ala Thr Ala Val Trp Gln Tyr Thr Ala Ser
515 520 525

Glu Thr Thr Pro Thr Ile Gly His Val Gly Pro Val Met Gly Lys Pro
530 535 540

Gly Asn Val Val Thr Ile Asp Gly Arg Gly Phe Gly Ser Ala Lys Gly
545 550 555 560

Thr Val Tyr Phe Gly Thr Thr Ala Val Thr Gly Ser Ala Ile Thr Ser
565 570 575

Trp Glu Asp Thr Gln Ile Lys Val Thr Ile Pro Pro Val Ala Gly Gly
580 585 590

Asp Tyr Ala Val Lys Val Ala Ala Asn Gly Val Asn Ser Asn Ala Tyr
595 600 605

Asn Asp Phe Thr Ile Leu Ser Gly Asp Gln Val Ser Val Arg Phe Val
610 615 620

Ile Asn Asn Ala Thr Thr Ala Leu Gly Glu Asn Ile Tyr Leu Thr Gly

625 630 635 640

Asn Val Ser Glu Leu Gly Asn Trp Thr Thr Gly Ala Ala Ser Ile Gly
645 650 655

Pro Ala Phe Asn Gln Val Ile His Ala Tyr Pro Thr Trp Tyr Tyr Asp
660 665 670

Val Ser Val Pro Ala Gly Lys Gln Leu Glu Phe Lys Phe Phe Lys Lys
675 680 685

Asn Gly Ala Thr Ile Thr Trp Glu Gly Gly Ser Asn His Thr Phe Thr
690 695 700

Thr Pro Thr Ser Gly Thr Ala Thr Val Thr Ile Asn Trp Gln
705 710 715

<210> 9
<211> 713
<212> PRT
<213> Bacillus sp. 1011

<400> 9

Met Lys Arg Phe Met Lys Leu Thr Ala Val Trp Thr Leu Trp Leu Ser
1 5 10 15

Leu Thr Leu Gly Leu Leu Ser Pro Val His Ala Ala Pro Asp Thr Ser
20 25 30

Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val Ile Tyr Gln Ile Phe
35 40 45

Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn Asn Pro Thr Gly Ala
50 55 60

Ala Phe Asp Gly Ser Cys Thr Asn Leu Arg Leu Tyr Cys Gly Gly Asp
65 70 75 80

Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met
85 90 95

Gly Ile Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Ile Tyr Ser
100 105 110

Val Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala Tyr His Gly Tyr Trp
115 120 125

Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr Gly Thr Met Gln Asp
130 135 140

Phe Lys Asn Leu Ile Asp Thr Ala His Ala His Asn Ile Lys Val Ile
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Ser Ser Asp Asp Pro
165 170 175

Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn Gly Asn Leu Leu Gly
180 185 190

Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His His Tyr Gly Gly Thr
195 200 205

Asp Phe Ser Thr Ile Glu Asn Gly Ile Tyr Lys Asn Leu Tyr Asp Leu
210 215 220

Ala Asp Leu Asn His Asn Asn Ser Ser Val Asp Val Tyr Leu Lys Asp
225 230 235 240

Ala Ile Lys Met Trp Leu Asp Leu Gly Val Asp Gly Ile Arg Val Asp
245 250 255

Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Met Ala Thr
260 265 270

Ile Asn Asn Tyr Lys Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Gly
275 280 285

Val Asn Glu Ile Ser Pro Glu Tyr His Gln Phe Ala Asn Glu Ser Gly
290 295 300

Met Ser Leu Leu Asp Phe Arg Phe Ala Gln Lys Ala Arg Gln Val Phe
305 310 315 320

Arg Asp Asn Thr Asp Asn Met Tyr Gly Leu Lys Ala Met Leu Glu Gly
325 330 335

Ser Glu Val Asp Tyr Ala Gln Val Asn Asp Gln Val Thr Phe Ile Asp
340 345 350

Asn His Asp Met Glu Arg Phe His Thr Ser Asn Gly Asp Arg Arg Lys
355 360 365

Leu Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser Arg Gly Val Pro Ala
370 375 380

Ile Tyr Tyr Gly Ser Glu Gln Tyr Met Ser Gly Gly Asn Asp Pro Asp
385 390 395 400

Asn Arg Ala Arg Leu Pro Ser Phe Ser Thr Thr Thr Thr Ala Tyr Gln
405 410 415

Val Ile Gln Lys Leu Ala Pro Leu Arg Lys Ser Asn Pro Ala Ile Ala
420 425 430

Tyr Gly Ser Thr His Glu Arg Trp Ile Asn Asn Asp Val Ile Ile Tyr
435 440 445

Glu Arg Lys Phe Gly Asn Asn Val Ala Val Val Ala Ile Asn Arg Asn
450 455 460

Met Asn Thr Pro Ala Ser Ile Thr Gly Leu Val Thr Ser Leu Arg Arg
465 470 475 480

Ala Ser Tyr Asn Asp Val Leu Gly Gly Ile Leu Asn Gly Asn Thr Leu
485 490 495

Thr Val Gly Ala Gly Gly Ala Ala Ser Asn Phe Thr Leu Ala Pro Gly
500 505 510

Gly Thr Ala Val Trp Gln Tyr Thr Thr Asp Ala Thr Thr Pro Ile Ile
515 520 525

Gly Asn Val Gly Pro Met Met Ala Lys Pro Gly Val Thr Ile Thr Ile
530 535 540

Asp Gly Arg Gly Phe Gly Ser Gly Lys Gly Thr Val Tyr Phe Gly Thr
545 550 555 560

Thr Ala Val Thr Gly Ala Asp Ile Val Ala Trp Glu Asp Thr Gln Ile

565

570

575

Gln Val Lys Ile Pro Ala Val Pro Gly Gly Ile Tyr Asp Ile Arg Val
580 585 590

Ala Asn Ala Ala Gly Ala Ala Ser Asn Ile Tyr Asp Asn Phe Glu Val
595 600 605

Leu Thr Gly Asp Gln Val Thr Val Arg Phe Val Ile Asn Asn Ala Thr
610 615 620

Thr Ala Leu Gly Gln Asn Val Phe Leu Thr Gly Asn Val Ser Glu Leu
625 630 635 640

Gly Asn Trp Asp Pro Asn Asn Ala Ile Gly Pro Met Tyr Asn Gln Val
645 650 655

Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Ser Val Pro Ala Gly
660 665 670

Gln Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln Gly Ser Thr Val Thr
675 680 685

Trp Glu Gly Gly Ala Asn Arg Thr Phe Thr Thr Pro Thr Ser Gly Thr
690 695 700

Ala Thr Val Asn Val Asn Trp Gln Pro
705 710

<210> 10

<211> 712

<212> PRT

<213> Bacillus sp. 38-2

<400> 10

Met Lys Arg Phe Met Lys Leu Thr Ala Val Trp Thr Leu Trp Leu Ser
1 5 10 15

Leu Thr Leu Gly Leu Leu Ser Pro Val His Ala Ala Pro Asp Thr Ser
20 25 30

Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val Ile Tyr Gln Ile Phe
35 40 45

Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn Asn Pro Thr Gly Ala
50 55 60

Ala Phe Asp Gly Ser Cys Thr Asn Leu Arg Leu Tyr Cys Gly Gly Asp
65 70 75 80

Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met
85 90 95

Gly Ile Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Ile Tyr Ser
100 105 110

Val Ile Asn Tyr Ser Gly Val His Asn Thr Ala Tyr His Gly Tyr Trp
115 120 125

Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr Gly Thr Met Gln Asp
130 135 140

Phe Lys Asn Leu Ile Asp Thr Ala His Ala His Asn Ile Lys Val Ile
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Ser Ser Asp Asp Pro
165 170 175

Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn Gly Asn Leu Leu Gly
180 185 190

Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His His Tyr Gly Gly Thr
195 200 205

Asp Phe Ser Thr Ile Glu Asn Gly Ile Tyr Lys Asn Leu Tyr Asp Leu
210 215 220

Ala Asp Leu Asn His Asn Asn Ser Ser Val Asp Val Tyr Leu Lys Asp
225 230 235 240

Ala Ile Lys Met Trp Leu Asp Leu Gly Val Asp Gly Ile Arg Val Asp
245 250 255

Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Met Ser Thr
260 265 270

Ile Asn Asn Tyr Lys Pro Val Phe Asn Phe Gly Glu Trp Phe Leu Gly
275 280 285

Val Asn Glu Ile Ser Pro Glu Tyr His Gln Phe Ala Asn Glu Ser Gly
290 295 300

Met Ser Leu Leu Asp Phe Pro Phe Ala Gln Lys Ala Arg Gln Val Phe
305 310 315 320

Arg Asp Asn Thr Asp Asn Met Tyr Gly Leu Lys Ala Met Leu Glu Gly
325 330 335

Ser Glu Val Asp Tyr Ala Gln Val Asn Asp Gln Val Thr Phe Ile Asp
340 345 350

Asn His Asp Met Glu Arg Phe His Thr Ser Asn Gly Asp Arg Arg Lys
355 360 365

Leu Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser Arg Gly Val Pro Ala
370 375 380

Ile Tyr Tyr Gly Ser Glu Gln Tyr Met Ser Gly Gly Asn Asp Pro Asp
385 390 395 400

Asn Arg Ala Arg Ile Pro Ser Phe Ser Thr Thr Thr Thr Ala Tyr Gln
405 410 415

Val Ile Gln Lys Leu Ala Pro Leu Arg Lys Ser Asn Pro Ala Ile Ala
420 425 430

Tyr Gly Ser Thr Gln Glu Arg Trp Ile Asn Asn Asp Val Ile Ile Tyr
435 440 445

Glu Arg Lys Phe Gly Asn Asn Val Ala Val Val Ala Ile Asn Arg Asn
450 455 460

Met Asn Thr Pro Ala Ser Ile Thr Gly Leu Val Thr Ser Leu Pro Gln
465 470 475 480

Gly Ser Tyr Asn Asp Val Leu Gly Gly Ile Leu Asn Gly Asn Thr Leu
485 490 495

Thr Val Gly Ala Gly Gly Ala Ala Ser Asn Phe Thr Leu Ala Pro Gly

500

505

510

Gly Thr Ala Val Trp Gln Tyr Thr Thr Asp Ala Thr Ala Pro Ile Asn
 515 520 525

Gly Asn Val Gly Pro Met Met Ala Lys Ala Gly Val Thr Ile Thr Ile
 530 535 540

Asp Gly Arg Ala Ser Ala Arg Gln Gly Thr Val Tyr Phe Gly Thr Thr
 545 550 555 560

Ala Val Thr Gly Ala Asp Ile Val Ala Trp Glu Asp Thr Gln Ile Gln
 565 570 575

Val Lys Ile Leu Arg Val Pro Gly Gly Ile Tyr Asp Ile Arg Val Ala
 580 585 590

Asn Ala Ala Gly Ala Ala Ser Asn Ile Tyr Asp Asn Phe Glu Val Leu
 595 600 605

Thr Gly Asp Gln Val Thr Val Arg Phe Val Ile Asn Asn Ala Thr Thr
 610 615 620

Ala Leu Gly Gln Asn Val Phe Leu Thr Gly Asn Val Ser Glu Leu Gly
 625 630 635 640

Asn Trp Asp Pro Asn Asn Ala Ile Gly Pro Met Tyr Asn Gln Val Val
 645 650 655

Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Ser Val Pro Ala Gly Gln
 660 665 670

Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln Gly Ser Thr Val Thr Trp
 675 680 685

Glu Gly Gly Ala Asn Arg Thr Phe Thr Thr Pro Thr Ser Gly Thr Ala
 690 695 700

Thr Val Asn Val Asn Trp Gln Pro
 705 710

<210> 11
 <211> 713

<212> PRT

<213> Bacillus circulans

<400> 11

Met Lys Lys Phe Leu Lys Ser Thr Ala Ala Leu Ala Leu Gly Leu Ser
1 5 10 15

Leu Thr Phe Gly Leu Phe Ser Pro Ala Gln Ala Ala Pro Asp Thr Ser
20 25 30

Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val Ile Tyr Gln Ile Phe
35 40 45

Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn Asn Pro Thr Gly Ala
50 55 60

Ala Phe Asp Gly Thr Cys Thr Asn Leu Arg Leu Tyr Cys Gly Gly Asp
65 70 75 80

Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met
85 90 95

Gly Val Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Ile Tyr Ser
100 105 110

Ile Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala Tyr His Gly Tyr Trp
115 120 125

Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr Gly Thr Ile Ala Asp
130 135 140

Phe Gln Asn Leu Ile Ala Ala Ala His Ala Lys Asn Ile Lys Val Ile
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Ser Ser Asp Gln Pro
165 170 175

Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn Gly Thr Leu Leu Gly
180 185 190

Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His His Asn Gly Gly Thr
195 200 205

Asp Phe Ser Thr Thr Glu Asn Gly Ile Tyr Lys Asn Leu Tyr Asp Leu
210 215 220

Ala Asp Leu Asn His Asn Asn Ser Thr Val Asp Val Tyr Leu Lys Asp
225 230 235 240

Ala Ile Lys Met Trp Leu Asp Leu Gly Ile Asp Gly Ile Arg Met Asp
245 250 255

Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Met Ala Ala
260 265 270

Val Asn Asn Tyr Lys Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Gly
275 280 285

Val Asn Glu Val Ser Pro Glu Asn His Lys Phe Ala Asn Glu Ser Gly
290 295 300

Met Ser Leu Leu Asp Phe Arg Phe Ala Gln Lys Val Arg Gln Val Phe
305 310 315 320

Arg Asp Asn Thr Asp Asn Met Tyr Gly Leu Lys Ala Met Leu Glu Gly
325 330 335

Ser Ala Ala Asp Tyr Ala Gln Val Asp Asp Gln Val Thr Phe Ile Asp
340 345 350

Asn His Asp Met Glu Arg Phe His Ala Ser Asn Ala Asn Arg Arg Lys
355 360 365

Leu Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser Arg Gly Val Pro Ala
370 375 380

Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Ser Gly Gly Thr Asp Pro Asp
385 390 395 400

Asn Arg Ala Arg Ile Pro Ser Phe Ser Thr Ser Thr Thr Ala Tyr Gln
405 410 415

Val Ile Gln Lys Leu Ala Pro Leu Arg Lys Cys Asn Pro Ala Ile Ala
420 425 430

Tyr Gly Ser Thr Gln Glu Arg Trp Ile Asn Asn Asp Val Leu Ile Tyr

435	440	445
Glu Arg Lys Phe Gly Ser Asn Val Ala Val Val Ala Val Asn Arg Asn 450 455 460		
Leu Asn Ala Pro Ala Ser Ile Ser Gly Leu Val Thr Ser Leu Pro Gln 465 470 475 480		
Gly Ser Tyr Asn Asp Val Leu Gly Gly Leu Leu Asn Gly Asn Thr Leu 485 490 495		
Ser Val Gly Ser Gly Gly Ala Ala Ser Asn Phe Thr Leu Ala Ala Gly 500 505 510		
Gly Thr Ala Val Trp Gln Tyr Thr Ala Ala Thr Ala Thr Pro Thr Ile 515 520 525		
Gly His Val Gly Pro Met Met Ala Lys Pro Gly Val Thr Ile Thr Ile 530 535 540		
Asp Gly Arg Gly Phe Gly Ser Ser Lys Gly Thr Val Tyr Phe Gly Thr 545 550 555 560		
Thr Ala Val Ser Gly Ala Asp Ile Thr Ser Trp Glu Asp Thr Gln Ile 565 570 575		
Lys Val Lys Ile Pro Ala Val Ala Gly Gly Asn Tyr Asn Ile Lys Val 580 585 590		
Ala Asn Ala Ala Gly Thr Ala Ser Asn Val Tyr Asp Asn Phe Glu Val 595 600 605		
Leu Ser Gly Asp Gln Val Ser Val Arg Phe Val Val Asn Asn Ala Thr 610 615 620		
Thr Ala Leu Gly Gln Asn Val Tyr Leu Thr Gly Ser Val Ser Glu Leu 625 630 635 640		
Gly Asn Trp Asp Pro Ala Lys Ala Ile Gly Pro Met Tyr Asn Gln Val 645 650 655		
Val Tyr Gln Tyr Pro Asn Trp Tyr Tyr Asp Val Ser Val Pro Ala Gly 660 665 670		

Lys Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln Gly Ser Thr Val Thr
675 680 685

Trp Glu Gly Gly Ser Asn His Thr Phe Thr Ala Pro Ser Ser Gly Thr
690 695 700

Ala Thr Ile Asn Val Asn Trp Gln Pro
705 710

<210> 12
<211> 686
<212> PRT
<213> Bacillus sp.

<400> 12

Ala Pro Asp Thr Ser Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val
1 5 10 15

Ile Tyr Gln Ile Phe Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn
20 25 30

Asn Pro Thr Gly Ala Ala Phe Asp Gly Ser Cys Thr Asn Leu Arg Leu
35 40 45

Tyr Cys Gly Gly Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly
50 55 60

Tyr Leu Thr Gly Met Gly Ile Thr Ala Ile Trp Ile Ser Gln Pro Val
65 70 75 80

Glu Asn Ile Tyr Ser Val Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala
85 90 95

Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr
100 105 110

Gly Thr Met Gln Asp Phe Lys Asn Leu Ile Asp Thr Ala His Ala His
115 120 125

Asn Ile Lys Val Ile Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala
130 135 140

Ser Ser Asp Asp Pro Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn
145 150 155 160

Gly Asn Leu Leu Gly Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His
165 170 175

His Tyr Gly Gly Thr Asp Phe Ser Thr Ile Glu Asn Gly Ile Tyr Lys
180 185 190

Asn Leu Tyr Asp Leu Ala Asp Leu Asn His Asn Asn Ser Ser Val Asp
195 200 205

Val Tyr Leu Lys Asp Ala Ile Lys Met Trp Leu Asp Leu Gly Val Asp
210 215 220

Gly Ile Arg Val Asp Ala Val Lys His Met Pro Phe Gly Trp Gln Lys
225 230 235 240

Ser Phe Met Ser Thr Ile Asn Asn Tyr Lys Pro Val Phe Thr Phe Gly
245 250 255

Glu Trp Phe Leu Gly Val Asn Glu Ile Ser Pro Glu Tyr His Gln Phe
260 265 270

Ala Asn Glu Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Ala Gln Lys
275 280 285

Ala Arg Gln Val Phe Arg Asp Asn Thr Asp Asn Met Tyr Gly Leu Lys
290 295 300

Ala Met Leu Glu Gly Ser Glu Val Asp Tyr Ala Gln Val Asn Asp Gln
305 310 315 320

Val Thr Phe Ile Asp Asn His Asp Met Glu Arg Phe His Thr Ser Asn
325 330 335

Gly Asp Arg Arg Lys Leu Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser
340 345 350

Arg Gly Val Pro Ala Ile Tyr Tyr Gly Ser Glu Gln Tyr Met Ser Gly
355 360 365

Gly Asn Asp Pro Asp Asn Arg Ala Arg Ile Pro Ser Phe Ser Thr Thr

[illegible]

Asn Val Ser Glu Leu Gly Asn Trp Asp Pro Asn Asn Ala Ile Gly Pro
610 615 620

Met Tyr Asn Gln Val Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val
625 630 635 640

Ser Val Pro Ala Gly Gln Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln
645 650 655

Gly Ser Thr Val Thr Trp Glu Gly Gly Ala Asn Arg Thr Phe Thr Thr
660 665 670

Pro Thr Ser Gly Thr Ala Thr Met Asn Val Asn Trp Gln Pro
675 680 685

<210> 13
<211> 704
<212> PRT
<213> Bacillus ohbensis

<400> 13

Met Lys Asn Leu Thr Val Leu Leu Lys Thr Ile Pro Leu Ala Leu Leu
1 5 10 15

Leu Phe Ile Leu Leu Ser Leu Pro Thr Ala Ala Gln Ala Asp Val Thr
20 25 30

Asn Lys Val Asn Tyr Thr Arg Asp Val Ile Tyr Gln Ile Val Thr Asp
35 40 45

Arg Phe Ser Asp Gly Asp Pro Ser Asn Asn Pro Thr Gly Ala Ile Tyr
50 55 60

Ser Gln Asp Cys Ser Asp Leu His Lys Tyr Cys Gly Gly Asp Trp Gln
65 70 75 80

Gly Ile Ile Asp Lys Ile Asn Asp Gly Tyr Leu Thr Asp Leu Gly Ile
85 90 95

Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Val Tyr Ala Leu His
100 105 110

Pro Ser Gly Tyr Thr Ser Tyr His Gly Tyr Trp Ala Arg Asp Tyr Lys
115 120 125

Arg Thr Asn Pro Phe Tyr Gly Asp Phe Ser Asp Phe Asp Arg Leu Met
130 135 140

Asp Thr Ala His Ser Asn Gly Ile Lys Val Ile Met Asp Phe Thr Pro
145 150 155 160

Asn His Ser Ser Pro Ala Leu Glu Thr Asp Pro Ser Tyr Ala Glu Asn
165 170 175

Gly Ala Val Tyr Asn Asp Gly Val Leu Ile Gly Asn Tyr Ser Asn Asp
180 185 190

Pro Asn Asn Leu Phe His His Asn Gly Gly Thr Asp Phe Ser Ser Tyr
195 200 205

Glu Asp Ser Ile Tyr Arg Asn Leu Tyr Asp Leu Ala Asp Tyr Asp Leu
210 215 220

Asn Asn Thr Val Met Asp Gln Tyr Leu Lys Glu Ser Ile Lys Leu Trp
225 230 235 240

Leu Asp Lys Gly Ile Asp Gly Ile Arg Val Asp Ala Val Lys His Met
245 250 255

Ser Glu Gly Trp Gln Thr Ser Leu Met Ser Asp Ile Tyr Ala His Glu
260 265 270

Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Gly Ser Gly Glu Val Asp
275 280 285

Pro Gln Asn His His Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp
290 295 300

Phe Gln Phe Gly Gln Thr Ile Arg Asp Val Leu Met Asp Gly Ser Ser
305 310 315 320

Asn Trp Tyr Asp Phe Asn Glu Met Ile Ala Ser Thr Glu Glu Asp Tyr
325 330 335

Asp Glu Val Ile Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Ser

340	345	350
Arg Phe Ser Phe Glu Gln Ser Ser Asn Arg His Thr Asp Ile Ala Leu		
355	360	365
Ala Val Leu Leu Thr Ser Arg Gly Val Pro Thr Ile Tyr Tyr Gly Thr		
370	375	380
Glu Gln Tyr Leu Thr Gly Gly Asn Asp Pro Glu Asn Arg Lys Pro Met		
385	390	395
Ser Asp Phe Asp Arg Thr Thr Asn Ser Tyr Gln Ile Ile Ser Thr Leu		
405	410	415
Ala Ser Leu Arg Gln Asn Asn Pro Ala Leu Gly Tyr Gly Asn Thr Ser		
420	425	430
Glu Arg Trp Ile Asn Ser Asp Val Tyr Ile Tyr Glu Arg Ser Phe Gly		
435	440	445
Asp Ser Val Val Leu Thr Ala Val Asn Ser Gly Asp Thr Ser Tyr Thr		
450	455	460
Ile Asn Asn Leu Asn Thr Ser Leu Pro Gln Gly Gln Tyr Thr Asp Glu		
465	470	475
Leu Gln Gln Leu Leu Asp Gly Asn Glu Ile Thr Val Asn Ser Asn Gly		
485	490	495
Ala Val Asp Ser Phe Gln Leu Ser Ala Asn Gly Val Ser Val Trp Gln		
500	505	510
Ile Thr Glu Glu His Ala Ser Pro Leu Ile Gly His Val Gly Pro Met		
515	520	525
Met Gly Lys His Gly Asn Thr Val Thr Ile Thr Gly Glu Gly Phe Gly		
530	535	540
Asp Asn Glu Gly Ser Val Leu Phe Asp Ser Asp Phe Ser Asp Val Leu		
545	550	555
Ser Trp Ser Asp Thr Lys Ile Glu Val Ser Val Pro Asp Val Thr Ala		
565	570	575

Gly His Tyr Asp Ile Ser Val Val Asn Ala Gly Asp Ser Gln Ser Pro
580 585 590

Thr Tyr Asp Lys Phe Glu Val Leu Thr Gly Asp Gln Val Ser Ile Arg
595 600 605

Phe Ala Val Asn Asn Ala Thr Thr Ser Leu Gly Thr Asn Leu Tyr Met
610 615 620

Val Gly Asn Val Asn Glu Leu Gly Asn Trp Asp Pro Asp Gln Ala Ile
625 630 635 640

Gly Pro Met Phe Asn Gln Val Met Tyr Gln Tyr Pro Thr Trp Tyr Tyr
645 650 655

Asp Ile Ser Val Pro Ala Glu Glu Asn Leu Glu Tyr Lys Phe Ile Lys
660 665 670

Lys Asp Ser Ser Gly Asn Val Val Trp Glu Ser Gly Asn Asn His Thr
675 680 685

Tyr Thr Thr Pro Ala Thr Gly Thr Asp Thr Val Leu Val Asp Trp Gln
690 695 700

<210> 14

<211> 703

<212> PRT

<213> Bacillus sp. 1-1

<400> 14

Met Asn Asp Leu Asn Asp Phe Leu Lys Thr Ile Leu Leu Ser Phe Ile
1 5 10 15

Phe Phe Leu Leu Leu Ser Leu Pro Thr Val Ala Glu Ala Asp Val Thr
20 25 30

Asn Lys Val Asn Tyr Ser Lys Asp Val Ile Tyr Gln Ile Val Thr Asp
35 40 45

Arg Phe Ser Asp Gly Asn Pro Gly Asn Asn Pro Ser Gly Ala Ile Phe
50 55 60

Ser Gln Asn Cys Ile Asp Leu His Lys Tyr Cys Gly Gly Asp Trp Gln
65 70 75 80

Gly Ile Ile Asp Lys Ile Asn Asp Gly Tyr Leu Thr Asp Leu Gly Ile
85 90 95

Thr Ala Leu Trp Ile Ser Gln Pro Val Glu Asn Val Tyr Ala Leu His
100 105 110

Pro Ser Gly Tyr Thr Ser Tyr His Gly Tyr Trp Ala Arg Asp Tyr Lys
115 120 125

Lys Thr Asn Pro Tyr Tyr Gly Asn Phe Asp Asp Phe Asp Arg Leu Met
130 135 140

Ser Thr Ala His Ser Asn Gly Ile Lys Val Ile Met Asp Phe Thr Pro
145 150 155 160

Asn His Ser Ser Pro Ala Leu Glu Thr Asn Pro Asn Tyr Val Glu Asn
165 170 175

Gly Ala Ile Tyr Asp Asn Gly Ala Leu Leu Gly Asn Tyr Ser Asn Asp
180 185 190

Gln Gln Asn Leu Phe His His Asn Gly Gly Thr Asp Phe Ser Ser Tyr
195 200 205

Glu Asp Ser Ile Tyr Arg Asn Leu Tyr Asp Leu Ala Asp Tyr Asp Leu
210 215 220

Asn Asn Thr Val Met Asp Gln Tyr Leu Lys Glu Ser Ile Lys Phe Trp
225 230 235 240

Leu Asp Lys Gly Ile Asp Gly Ile Arg Val Asp Ala Val Lys His Met
245 250 255

Ser Glu Gly Trp Gln Thr Ser Leu Met Ser Glu Ile Tyr Ser His Lys
260 265 270

Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Gly Ser Gly Glu Val Asp
275 280 285

Pro Gln Asn His His Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp

290		295		300
Phe Gln Phe Gly Gln Thr Ile Arg Asn Val Leu Lys Asp Arg Thr Ser				
305		310		315 320
Asn Trp Tyr Asp Phe Asn Glu Met Ile Thr Ser Thr Glu Lys Glu Tyr				
	325		330	335
Asn Glu Val Ile Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Ser				
	340		345	350
Arg Phe Ser Val Gly Ser Ser Ser Asn Arg Gln Thr Asp Met Ala Leu				
	355		360	365
Ala Val Leu Leu Thr Ser Arg Gly Val Pro Thr Ile Tyr Tyr Gly Thr				
	370		375	380
Glu Gln Tyr Val Thr Gly Gly Asn Asp Pro Glu Asn Arg Lys Pro Leu				
385		390		395 400
Lys Thr Phe Asp Arg Ser Thr Asn Ser Tyr Gln Ile Ile Ser Lys Leu				
	405		410	415
Ala Ser Leu Arg Gln Thr Asn Ser Ala Leu Gly Tyr Gly Thr Thr Thr				
	420		425	430
Glu Arg Trp Leu Asn Glu Asp Ile Tyr Ile Tyr Glu Arg Thr Phe Gly				
	435		440	445
Asn Ser Ile Val Leu Thr Ala Val Asn Ser Ser Asn Ser Asn Gln Thr				
	450		455	460
Ile Thr Asn Leu Asn Thr Ser Leu Pro Gln Gly Asn Tyr Thr Asp Glu				
465		470		475 480
Leu Gln Gln Arg Leu Asp Gly Asn Thr Ile Thr Val Asn Ala Asn Gly				
	485		490	495
Ala Val Asn Ser Phe Gln Leu Arg Ala Asn Ser Val Ala Val Trp Gln				
	500		505	510
Val Ser Asn Pro Ser Thr Ser Pro Leu Ile Gly Gln Val Gly Pro Met				
	515		520	525

Met Gly Lys Ala Gly Asn Thr Ile Thr Val Ser Gly Glu Gly Phe Gly
530 535 540

Asp Glu Arg Gly Ser Val Leu Phe Asp Ser Thr Ser Ser Glu Ile Ile
545 550 555 560

Ser Trp Ser Asn Thr Lys Ile Ser Val Lys Val Pro Asn Val Ala Gly
565 570 575

Gly Tyr Tyr Asp Leu Ser Val Val Thr Ala Ala Asn Ile Lys Ser Pro
580 585 590

Thr Tyr Lys Glu Phe Glu Val Leu Ser Gly Asn Gln Val Ser Val Arg
595 600 605

Phe Gly Val Asn Asn Ala Thr Thr Ser Pro Gly Thr Asn Leu Tyr Ile
610 615 620

Val Gly Asn Val Asn Glu Leu Gly Asn Trp Asp Ala Asp Lys Ala Ile
625 630 635 640

Gly Pro Met Phe Asn Gln Val Met Tyr Gln Tyr Pro Thr Trp Tyr Tyr
645 650 655

Asp Ile Ser Val Pro Ala Gly Lys Asn Leu Glu Tyr Lys Tyr Ile Lys
660 665 670

Lys Asp Gln Asn Gly Asn Val Val Trp Gln Ser Gly Asn Asn Arg Thr
675 680 685

Tyr Thr Ser Pro Thr Thr Gly Thr Asp Thr Val Met Ile Asn Trp
690 695 700

<210> 15

<211> 711

<212> PRT

<213> Bacillus stearothermophilus

<400> 15

Met Arg Arg Trp Leu Ser Leu Val Leu Ser Met Ser Phe Val Phe Ser
1 5 10 15

Ala Ile Phe Ile Val Ser Asp Thr Gln Lys Val Thr Val Glu Ala Ala
20 25 30

Gly Asn Leu Asn Lys Val Asn Phe Thr Ser Asp Val Val Tyr Gln Ile
35 40 45

Val Val Asp Arg Phe Val Asp Gly Asn Thr Ser Asn Asn Pro Ser Gly
50 55 60

Ala Leu Phe Ser Ser Gly Cys Thr Asn Leu Arg Lys Tyr Cys Gly Gly
65 70 75 80

Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly Tyr Leu Thr Asp
85 90 95

Met Gly Val Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Val Phe
100 105 110

Ser Val Met Asn Asp Ala Ser Gly Ser Ala Ser Tyr His Gly Tyr Trp
115 120 125

Ala Arg Asp Phe Lys Lys Pro Asn Pro Phe Phe Gly Thr Leu Ser Asp
130 135 140

Phe Gln Arg Leu Val Asp Ala Ala His Ala Lys Gly Ile Lys Val Ile
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Ser Glu Thr Asn Pro
165 170 175

Ser Tyr Met Glu Asn Gly Arg Leu Tyr Asp Asn Gly Thr Leu Leu Gly
180 185 190

Gly Tyr Thr Asn Asp Ala Asn Met Tyr Phe His His Asn Gly Gly Thr
195 200 205

Thr Phe Ser Ser Leu Glu Asp Gly Ile Tyr Arg Asn Leu Phe Asp Leu
210 215 220

Ala Asp Leu Asn His Gln Asn Pro Val Ile Asp Arg Tyr Leu Lys Asp
225 230 235 240

Ala Val Lys Met Trp Ile Asp Met Gly Ile Asp Gly Ile Arg Met Asp

245	250	255
Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Leu Met Asp Glu		
260	265	270
Ile Asp Asn Tyr Arg Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Ser		
275	280	285
Glu Asn Glu Val Asp Ala Asn Asn His Tyr Phe Ala Asn Glu Ser Gly		
290	295	300
Met Ser Leu Leu Asp Phe Arg Phe Gly Gln Lys Leu Arg Gln Val Leu		
305	310	315
Arg Asn Asn Ser Asp Asn Trp Tyr Gly Phe Asn Gln Met Ile Gln Asp		
325	330	335
Thr Ala Ser Ala Tyr Asp Glu Val Leu Asp Gln Val Thr Phe Ile Asp		
340	345	350
Asn His Asp Met Asp Arg Phe Met Ile Asp Gly Gly Asp Pro Arg Lys		
355	360	365
Val Asp Met Ala Leu Ala Val Leu Leu Thr Ser Arg Gly Val Pro Asn		
370	375	380
Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly Asn Gly Asp Pro Asn		
385	390	395
Asn Arg Lys Met Met Ser Ser Phe Asn Lys Asn Thr Arg Ala Tyr Gln		
405	410	415
Val Ile Gln Lys Leu Ser Ser Leu Arg Arg Asn Asn Pro Ala Leu Ala		
420	425	430
Tyr Gly Asp Thr Glu Gln Arg Trp Ile Asn Gly Asp Val Tyr Val Tyr		
435	440	445
Glu Arg Gln Phe Gly Lys Asp Val Val Leu Val Ala Val Asn Arg Ser		
450	455	460
Ser Ser Ser Asn Tyr Ser Ile Thr Gly Leu Phe Thr Ala Leu Pro Ala		
465	470	475
		480

Gly Thr Tyr Thr Asp Gln Leu Gly Gly Leu Leu Asp Gly Asn Thr Ile
485 490 495

Gln Val Gly Ser Asn Gly Ser Val Asn Ala Phe Asp Leu Gly Pro Gly
500 505 510

Glu Val Gly Val Trp Ala Tyr Ser Ala Thr Glu Ser Thr Pro Ile Ile
515 520 525

Gly His Val Gly Pro Met Met Gly Gln Val Gly His Gln Val Thr Ile
530 535 540

Asp Gly Glu Gly Phe Gly Thr Asn Thr Gly Thr Val Lys Phe Gly Thr
545 550 555 560

Thr Ala Ala Asn Val Val Ser Trp Ser Asn Asn Gln Ile Val Val Ala
565 570 575

Val Pro Asn Val Ser Pro Gly Lys Tyr Asn Ile Thr Val Gln Ser Ser
580 585 590

Ser Gly Gln Thr Ser Ala Ala Tyr Asp Asn Phe Glu Val Leu Thr Asn
595 600 605

Asp Gln Val Ser Val Arg Phe Val Val Asn Asn Ala Thr Thr Asn Leu
610 615 620

Gly Gln Asn Ile Tyr Ile Val Gly Asn Val Tyr Glu Leu Gly Asn Trp
625 630 635 640

Asp Thr Ser Lys Ala Ile Gly Pro Met Phe Asn Gln Val Val Tyr Ser
645 650 655

Tyr Pro Thr Trp Tyr Ile Asp Val Ser Val Pro Glu Gly Lys Thr Ile
660 665 670

Glu Phe Lys Phe Ile Lys Lys Asp Ser Gln Gly Asn Val Thr Trp Glu
675 680 685

Ser Gly Ser Asn His Val Tyr Thr Thr Pro Thr Asn Thr Thr Gly Lys
690 695 700

Ile Ile Val Asp Trp Gln Asn
705 710

<210> 16
<211> 655
<212> PRT
<213> *Klebsiella pneumoniae*

<400> 16

Met Lys Arg Asn Arg Phe Phe Asn Thr Ser Ala Ala Ile Ala Ile Ser
1 5 10 15

Ile Ala Leu Asn Thr Phe Phe Cys Ser Met Gln Thr Ile Ala Ala Glu
20 25 30

Pro Glu Glu Thr Tyr Leu Asp Phe Arg Lys Glu Thr Ile Tyr Phe Leu
35 40 45

Phe Leu Asp Arg Phe Ser Asp Gly Asp Pro Ser Asn Asn Ala Gly Phe
50 55 60

Asn Ser Ala Thr Tyr Asp Pro Asn Asn Leu Lys Lys Tyr Thr Gly Gly
65 70 75 80

Asp Leu Arg Gly Leu Ile Asn Lys Leu Pro Tyr Leu Lys Ser Leu Gly
85 90 95

Val Thr Ser Ile Trp Ile Thr Pro Pro Ile Asp Asn Val Asn Asn Thr
100 105 110

Asp Ala Ala Gly Asn Thr Gly Tyr His Gly Tyr Trp Gly Arg Asp Tyr
115 120 125

Phe Arg Ile Asp Glu His Phe Gly Asn Leu Asp Asp Phe Lys Glu Leu
130 135 140

Thr Ser Leu Met His Ser Pro Asp Tyr Asn Met Lys Leu Val Leu Asp
145 150 155 160

Tyr Ala Pro Asn His Ser Asn Ala Asn Asp Glu Asn Glu Phe Gly Ala
165 170 175

Leu Tyr Arg Asp Gly Val Phe Ile Thr Asp Tyr Pro Thr Asn Val Ala

180					185					190					
Ala	Asn	Thr	Gly	Trp	Tyr	His	His	Asn	Gly	Gly	Val	Thr	Asn	Trp	Asn
	195						200					205			
Asp	Phe	Phe	Gln	Val	Lys	Asn	His	Asn	Leu	Phe	Asn	Leu	Ser	Asp	Leu
	210					215					220				
Asn	Gln	Ser	Asn	Thr	Asp	Val	Tyr	Gln	Tyr	Leu	Leu	Asp	Gly	Ser	Lys
225					230					235					240
Phe	Trp	Ile	Asp	Ala	Gly	Val	Asp	Ala	Ile	Arg	Ile	Asp	Ala	Ile	Lys
				245					250					255	
His	Met	Asp	Lys	Ser	Phe	Ile	Gln	Lys	Trp	Thr	Ser	Asp	Ile	Tyr	Asp
			260					265					270		
Tyr	Ser	Lys	Ser	Ile	Gly	Arg	Glu	Gly	Phe	Phe	Phe	Phe	Gly	Glu	Trp
		275					280						285		
Phe	Gly	Ala	Ser	Ala	Asn	Thr	Thr	Thr	Gly	Val	Asp	Gly	Asn	Ala	Ile
	290					295					300				
Asp	Tyr	Ala	Asn	Thr	Ser	Gly	Ser	Ala	Leu	Leu	Asp	Phe	Gly	Phe	Arg
305					310					315					320
Asp	Thr	Leu	Glu	Arg	Val	Leu	Val	Gly	Arg	Ser	Gly	Asn	Thr	Met	Lys
				325					330					335	
Thr	Leu	Asn	Ser	Tyr	Leu	Ile	Lys	Arg	Gln	Thr	Val	Phe	Thr	Ser	Asp
			340					345					350		
Asp	Trp	Gln	Val	Val	Phe	Met	Asp	Asn	His	Asp	Met	Ala	Arg	Ile	Gly
		355					360					365			
Thr	Ala	Leu	Arg	Ser	Asn	Ala	Thr	Thr	Phe	Gly	Pro	Gly	Asn	Asn	Glu
	370					375					380				
Thr	Gly	Gly	Ser	Gln	Ser	Glu	Ala	Phe	Ala	Gln	Lys	Arg	Ile	Asp	Leu
385					390					395					400
Gly	Leu	Val	Ala	Thr	Met	Thr	Val	Arg	Gly	Ile	Pro	Ala	Ile	Tyr	Tyr
				405					410					415	

Gly Thr Glu His Tyr Ala Ala Asn Phe Thr Ser Asn Ser Phe Gly Gln
420 425 430

Val Gly Ser Asp Pro Tyr Asn Arg Glu Lys Met Pro Gly Phe Asp Thr
435 440 445

Glu Ser Glu Ala Phe Ser Ile Ile Lys Thr Leu Gly Asp Leu Arg Lys
450 455 460

Ser Ser Pro Ala Ile Gln Asn Gly Thr Tyr Thr Glu Leu Trp Val Asn
465 470 475 480

Asp Asp Ile Leu Val Phe Glu Arg Arg Ser Gly Asn Asp Ile Val Ile
485 490 495

Val Ala Leu Asn Arg Gly Glu Ala Asn Thr Ile Asn Val Lys Asn Ile
500 505 510

Ala Val Pro Asn Gly Val Tyr Pro Ser Leu Ile Gly Asn Asn Ser Val
515 520 525

Ser Val Ala Asn Lys Arg Thr Thr Leu Thr Leu Met Gln Asn Glu Ala
530 535 540

Val Val Ile Arg Ser Gln Ser Asp Asp Ala Glu Asn Pro Thr Val Gln
545 550 555 560

Ser Ile Asn Phe Thr Cys Asn Asn Gly Tyr Thr Ile Ser Gly Gln Ser
565 570 575

Val Tyr Ile Ile Gly Asn Ile Pro Gln Leu Gly Gly Trp Asp Leu Thr
580 585 590

Lys Ala Val Lys Ile Ser Pro Thr Gln Tyr Pro Gln Trp Ser Ala Ser
595 600 605

Leu Glu Leu Pro Ser Asp Leu Asn Val Glu Trp Lys Cys Val Lys Arg
610 615 620

Asn Glu Thr Asn Pro Thr Ala Asn Val Glu Trp Gln Ser Gly Ala Asn
625 630 635 640

Asn Gln Phe Asn Ser Asn Asp Thr Gln Thr Thr Asn Gly Ser Phe
645 650 655

<210> 17
<211> 686
<212> PRT
<213> Bacillus stearothermophilus

<400> 17

Ser Ser Ser Ala Ser Val Lys Gly Asp Val Ile Tyr Gln Ile Ile Ile
1 5 10 15

Asp Arg Phe Tyr Asp Gly Asp Thr Thr Asn Asn Asn Pro Ala Lys Ser
20 25 30

Tyr Gly Leu Tyr Asp Pro Thr Lys Ser Lys Trp Lys Met Tyr Trp Gly
35 40 45

Gly Asp Leu Glu Gly Val Arg Gln Lys Leu Pro Tyr Leu Lys Gln Leu
50 55 60

Gly Val Thr Thr Ile Trp Leu Ser Pro Val Leu Asp Asn Leu Asp Thr
65 70 75 80

Leu Ala Gly Thr Asp Asn Thr Gly Tyr His Gly Tyr Trp Thr Arg Asp
85 90 95

Phe Lys Gln Ile Glu Glu His Phe Gly Asn Trp Thr Thr Phe Asp Thr
100 105 110

Leu Val Asn Asp Ala His Gln Asn Gly Ile Lys Val Ile Val Asp Phe
115 120 125

Val Pro Asn His Ser Thr Pro Phe Lys Ala Asn Asp Ser Thr Phe Ala
130 135 140

Glu Gly Gly Ala Leu Tyr Asn Asn Gly Thr Tyr Met Gly Asn Tyr Phe
145 150 155 160

Asp Asp Ala Thr Lys Gly Tyr Phe His His Asn Gly Asp Ile Ser Asn
165 170 175

Trp Asp Asp Arg Tyr Glu Ala Gln Trp Lys Asn Phe Thr Asp Pro Ala

180

185

190

Gly Phe Ser Leu Ala Asp Leu Ser Gln Glu Asn Gly Thr Ile Ala Gln
 195 200 205

Tyr Leu Thr Asp Ala Ala Val Gln Leu Val Ala His Gly Ala Asp Gly
 210 215 220

Leu Arg Ile Asp Ala Val Lys His Phe Asn Ser Gly Phe Ser Lys Ser
 225 230 235 240

Leu Ala Asp Lys Leu Tyr Gln Lys Lys Asp Ile Phe Leu Val Gly Glu
 245 250 255

Trp Tyr Gly Asp Asp Pro Gly Thr Ala Asn His Leu Glu Lys Val Arg
 260 265 270

Tyr Ala Asn Asn Ser Gly Val Asn Val Leu Asp Phe Asp Leu Asn Thr
 275 280 285

Val Ile Arg Asn Val Phe Gly Thr Phe Thr Gln Thr Met Tyr Asp Leu
 290 295 300

Asn Asn Met Val Asn Gln Thr Gly Asn Glu Tyr Lys Tyr Lys Glu Asn
 305 310 315 320

Leu Ile Thr Phe Ile Asp Asn His Asp Met Ser Arg Phe Leu Ser Val
 325 330 335

Asn Ser Asn Lys Ala Asn Leu His Gln Ala Leu Ala Phe Ile Leu Thr
 340 345 350

Ser Arg Gly Thr Pro Ser Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Ala
 355 360 365

Gly Gly Asn Asp Pro Tyr Asn Arg Gly Met Met Pro Ala Phe Asp Thr
 370 375 380

Thr Thr Thr Ala Phe Lys Glu Val Ser Thr Leu Ala Gly Leu Arg Arg
 385 390 395 400

Asn Asn Ala Ala Ile Gln Tyr Gly Thr Thr Thr Gln Arg Trp Ile Asn
 405 410 415

Asn Asp Val Tyr Ile Tyr Glu Arg Lys Phe Phe Asn Asp Val Val Leu
420 425 430

Val Ala Ile Asn Arg Asn Thr Gln Ser Ser Tyr Ser Ile Ser Gly Leu
435 440 445

Gln Thr Ala Leu Pro Asn Gly Ser Tyr Ala Asp Tyr Leu Ser Gly Leu
450 455 460

Leu Gly Gly Asn Gly Ile Ser Val Ser Asn Gly Ser Val Ala Ser Phe
465 470 475 480

Thr Leu Ala Pro Gly Ala Val Ser Val Trp Gln Tyr Ser Thr Ser Ala
485 490 495

Ser Ala Pro Gln Ile Gly Ser Val Ala Pro Asn Met Gly Ile Pro Gly
500 505 510

Asn Val Val Thr Ile Asp Gly Lys Gly Phe Gly Thr Thr Gln Gly Thr
515 520 525

Val Thr Phe Gly Gly Val Thr Ala Thr Val Lys Ser Trp Thr Ser Asn
530 535 540

Arg Ile Glu Val Tyr Val Pro Asn Met Ala Ala Gly Leu Thr Asp Val
545 550 555 560

Lys Val Thr Ala Gly Gly Val Ser Ser Asn Leu Tyr Ser Tyr Asn Ile
565 570 575

Leu Ser Gly Thr Gln Thr Ser Val Val Phe Thr Val Lys Ser Ala Pro
580 585 590

Pro Thr Asn Leu Gly Asp Lys Ile Tyr Leu Thr Gly Asn Ile Pro Glu
595 600 605

Leu Gly Asn Trp Ser Thr Asp Thr Ser Gly Ala Val Asn Asn Ala Gln
610 615 620

Gly Pro Leu Leu Ala Pro Asn Tyr Pro Asp Trp Phe Tyr Val Phe Ser
625 630 635 640

Val Pro Ala Gly Lys Thr Ile Gln Phe Lys Phe Phe Ile Lys Arg Ala
645 650 655

Asp Gly Thr Ile Gln Trp Glu Asn Gly Ser Asn His Val Ala Thr Thr
660 665 670

Pro Thr Gly Ala Thr Gly Asn Ile Thr Val Thr Trp Gln Asn
675 680 685

<210> 18
<211> 7
<212> PRT
<213> Artificial sequence

<220>
<223> Variant

<400> 18

Thr Leu Ala Gly Thr Asp Asn
1 5

<210> 19
<211> 11
<212> PRT
<213> Artificial sequence

<220>
<223> Variant

<400> 19

Tyr Gly Asp Asp Pro Gly Thr Ala Asn His Leu
1 5 10

<210> 20
<211> 12
<212> PRT
<213> Artificial sequence

<220>
<223> Variant

<400> 20

Tyr Gly Asp Asp Pro Gly Thr Ala Asn His Leu Glu
1 5 10